AMATEUR SATELLITE REPORT

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FLASH! FIRST KICK MOTOR BURN OK!!!

AO-13's first kick motor burn was successfully executed at 1857 UTC, June 22. The 50 second burn added 136.4 meters/second to the velocity, raised to perigee by 800 km to about 1035 km and raised the inclination by about 4 degrees to about 13.9 degrees. At press time analysts were developing a new Keplerian element set for AO-13. An accurate element set should be available by the time you read this. A second and final (?) kick motor burn may be accomplished in a couple of weeks after reorientation and spin up.

Ariane V-22 Launch Letter Perfect: AMSAT OSCAR 13 Is Born

Prolog: Ode To A Gracious European Lady
(A personal tribute by WA2LQQ)

As millions around the world held their breath, focused their eyes and ears, the countdown approached zero. The center of focus stood solemnly on the edge of a jungle whose floor was only recently carpeted with concrete and steel. A 20-story tall rocket called Ariane, occasionally belching puffs of frosty fumes hundreds of degrees colder than the morning air, was about to confront her destiny. And on her wings rode the hopes and aspirations of nations and of individuals; of huge industrial consortia and of solitary craftsman.

But then the waiting was over. As if released from a huge bow, this metallic arrow with her precious cargo at first strained and then, with a burst of exhilaration at being unshackled, leaped into the azure sky over the Atlantic. Ariane-4 was on her way leaving behind a writhing quilt of orange-black and white as if millions of tropical bird feathers had been loosed by the fury of her voice and these were now plying the air currents on their way to the sea.

It was obvious from the start there was a lot at stake here. But as each mission milestone was checked off it became clear that this was a true arrow indeed. Second by second, minute by minute she climbed to the very ends of the earth. Looking back, she must have thought it all worthwhile, these years in becoming. Now that she WAS, these 20 minutes fulfilling her destiny were profoundly satisfying.

And before most realized it, it WAS time. One by one the golden boxes were gently placed in their ethereal hammocks. Having done her job, it was time to go. Ariane, this gracious European lady, turned and faded from view.

AMSAT OSCAR 13 In Orbit, Under Control and Working Perfectly

Amateur Radio is celebrating the birth of a new star as it welcomes AMSAT OSCAR 13. The newest OSCAR came to life right on schedule June 15 after a letter-perfect launch by the new Ariane-4. Elated listeners around the world listened in on an international teleconference network as the launch ticked off every milestone on schedule. Two hours and 50 minutes after launch, AO-13 sprang to life, its first telemetry indicating it was alive and well.

The weather was perfect for the launch. Skies over the Kourou Space Center in French Guiana were clear and blue. After a six minute hold, the 20-story tall Ariane-4 three-stage rocket leaped from the jungle floor with its cargo of three communications satellites. Launch time was put at 11:19:04.33 UTC or just over 6 minutes into the first of two launch windows. Performance of the launcher was apparently perfect and the planned trajectory was followed with negligible deviations.

Twenty minutes into the mission, Meteosat was the first satellite to be deployed followed 4 seconds later by Phase 3C in its canister. Finally, Panamsat sprang from the SPELDA and it too became a new earth satellite. But it would be another 60 minutes before AO-13 would be officially born. For a full hour it rode within its metallic cocoon; the cylindrical carrying structure.

Then, at exactly 12:39:04 UTC, Phase 3C was ejected from the carrying structure and officially became AO-13. This sequence was not instrumented but can be inferred as occurring on time by other circumstantial evidence. It would, however, remain unknown for another hour and a half that the ejection had taken place OK.

The stage was set. AO-13 was then at 27,000 km altitude over the Indian Ocean. Would the beacon be heard as expected?

At precisely 14:03:38 UTC the new babe uttered its first telemetry. This was immediately acquired by listeners across the Pacific and Indian Oceans. AO-13 was not only BORN but unequivocal in its birth cries. It was alive, well and anxious to tell the world of its existence. ZL1AOX reported the beacon on 145.812 MHz steady and strong. The telemetry values showed all important parameters were "on the money". The temperature was about 10 degrees C. Power was good. Spin was 7.9 rpm. Pressure in the Helium tank was nominal. In general, this was a very healthy baby indeed!

Soon, more reports of AO-13 telemetry reception began to arrive. JA1ANG and JAMSAT colleagues in Japan had AOS at 14:03:55. ZS6AKV and colleagues in SA AMSAT had AOS virtually at the same moment. Throughout the Indian Ocean and Western Pacific, AO-13's footprint spread north and west and then blossomed as apogee was approached. By 1700 UTC, much of central Europe was in the footprint. Soon DB2OS would obtain AOS. He was to initiate the first commands, previously stored in the IHU, to begin re-orienting the spacecraft and start the spin-up to an intermediate attitude on the way to the first kick motor firing attitude scheduled to be accomplished by Wednesday, June 22.

Short Bursts

- AMSAT officials say we're still on track for first AO-13 transponder operations within 4 to 6 weeks of launch. So prospective operators should look forward being on AO-13 not later than August 1 if the kick motor burns all go according to plan.
- The Launch Team in Kourou, French Guiana consisted six individuals from three AMSAT organizations. From AMSAT-DL were Hanspeter, DK1YQ (Leader); Don DJØHC/KE6MN; Hermann, DK8CI and Hans, DF4FE.

From Brazil AMSAT was Junior, PY2BJO. Dave, WDØHHU, represented AMSAT-NA.

• A glitch in tracking AO-13 with some versions of the N4HY Quiktrak program has shown up. Apparently it has something to do with the eccentricity of AO-13's current (GTO) orbit. N4HY says he's looking into a fix. In any case, the problem will probably go away when the eccentricity is reduced as a result of the first kick motor.

• Here is the FO-12 operating schedule.

Mode	From	(UTC)	
JA	Jul 02	0103	JD = Digital Mode
D	04	0116	JA = Analog mode
JD*	07	1530	D = All systems off
JD	07	1935	DI = Systems off except CPU and memory
DI	08	0143	
JD	09	0049	
DI	09	2355	
JA	13	1409	
D	14	1315	*From 1530 to 1732 UTC, July 7, acquisition of telemetry will be every 2 seconds. The mailbox will be disabled during this interval. The transponders will be off at other times. The actual operating schedule may change due to unexpected situations such as variations in available power.
JA	16	1328	
D	17	1235	
JD	20	1356	
DI	21	1301	
JD	23	1141	
DI	24	1020	
JD	26	1033	
DI	27	1141	
JD	30	1100	
DI	Jul 31	1006	

First AO-13 Kick Motor Firing Imminent

AO-13 had no sooner emitted its first telemetry than the command stations were already poking around to see how it was. The scene was reminiscent of a new-born in the hands of the obstetrician: a gentle squeeze here, a little poke there; listen to the cry; sounds like a good one!

First telemetry analysis by Ian Ashley, ZL1AOX, just after the General Beacon was activated showed everything was indeed fine. He then tried out the Engineering Beacon and it proved loud and stable too.

Then, when AOS was obtained in Germany, Peter Guelzow, DB2OS, working in conjunction with Karl Meinzer, DJ4ZC, checked the telemetry and then activated a command pre-stored in the satellite's computer (IHU). This began the first of a series of about three attitude changes to position the spacecraft for the first kick motor burn.

The attitude in Bahn coordinates on 17 June was -90 degrees Longitude and -35 degrees Latitude. According to DB2OS, that would be changed to -90/-70 by 18 June and finally to +90/-60 by 22 June. The satellite by then will have been spun up to between 30 and 40 rpm.

There was some urgency in getting the first kick motor burn done as soon as possible. The risk is not that the satellite would de-orbit soon as earlier reported, although it's loosing 30 to 40 km per day from apogee. The asymmetrical drag at perigee increases uncertainty regarding actual attitude and amounts to as much as 5 degrees according to DJ4ZC. An error of this magnitude could reduce the effectiveness of the motor burn.

The asymmetrical drag has the effect of changing the spin axis. It is caused by unequal atmospheric pressure on the spacecraft as it plummets down towards the lower reaches of the ionosphere only some 220 km (137 miles) high during perigee passages. AO-13's altitude spans a range of 164 to 1; that's 22 dBkm! At perigee, it's passing through the sparse gas of the F1-layer at a velocity of 17,480 mph so the effect of even the relatively few gas molecules it impacts can be a significant torque changing the spin axis.

Consequently, the pre-launch plan has been modified according to KA9Q who, with N4HY, has helped plan the kick motor burn strategy with DJ4ZC. First, the satellite will be spun up to 40 rpm. Then, a burn of 20 counts will be done. This should result in a delta-V of 150 meters/sec; about a third of that previously planned for the first burn. This will raise inclination by 5 degrees (to 15 degrees) and raise perigee to 1000 km.

The new strategy will add a significant safety margin against the uncertainty in attitude caused by the drag. The new plan will consume slightly more fuel in the end, but the insurance is thought to be worth it. The first burn will consume only about 10% of the delta-V capacity of the spacecraft. Assuming the attitude maneuvers go according to plan, the first burn could occur June 22. Then, with a comfortably high perigee, the burns into final orbit could be planned a bit more leisurely, according to KA9Q.

Updated Telemetry Channel Allocations and Equations

Telemetry Channel	Function	Equation	Units
00	Solar panel out and BCR input voltage	(n-10)•167	mV
01	70 cm xmtr average power output	(261-n)²/724	W
02	70 cm rcvr temperature	(n-120)/1.71	C
03	(Reserved)		-
04	BCR output and main battery voltage	(n-10)•79.5	mV
05	(Special Purpose)	xxxxxxxxxx	-
06	2 m xmtr power amplifier temperature	(n-120)/1.71	C
07	+14 volt rail current to xponder	(n-15)•24.27	mA
08	+10 volt regulator voltage	(n-10)•53.2	mV
09	Helium tank high pressure	(n-14)•6.56	Bar
0A	IHU temperature	(n-120)/1.71	C
0B	+14 volt rail current to magnetorquers and antenna relay	(n-15)•4.854	- mA
0C	BCR oscillator #1 status	0 = Off; N > 10 = On	-
0D	He tank low side pressure control voltage	(n-15)•.117	Bar (abs)
0E	BCR temperature	(n-120)/1.71	C
0F	+10 volt regulator current	(n-15)•4.854	mA
10	BCR oscillator #2 status	0 = Off; N > 10 = On	-
11	N2O2 tank pressure	(n-106)•0.733	Bar
12	SEU temperature	(n-120)/1.71	C
13	Battery charge current	(n-15)•12.135	mA
14	Top (+Z) photocell sun sensor	(n-10)•8.53	mV
15	Motor valve status	102 = Closed, 118 = Open	-
16	Auxillary battery #1 temperature	(n-120)/1.71	C
17	Active BCR ouput current	(n-15)•24.27	mA
18	Bottom (-Z) photocell sensor	(n-10)•8.53	mA
19	XXXXXXXXXX		-
1A	Auxillary battery #2 temperature	(n-120)/1.71	C
1B	Active BCR input current on 28 volt line	(n-15)•12.135	mA
1C	Spin rate {if n < 139, or {if n > = 139	r = (131-n)•0.85 + 20 r = 479/(n-109)-2	rpm rpm
1D	L rcvr AGC	(n-75)²/-1125	dB
1E	Main battery temperature	(n-120)/1.71	C
1F	Solar panel #6 current	(n-15)•4.854	mA
20	2m xmtr average power output	(287-n)²/1796	W
21	He tank temperature	(n-120)/1.71	C
22	Solar panel #1 temperature	(n-120)/1.71	C
23	Solar panel #5 current	(n-15)•4.854	mA
24	70 cm rcvr AGC	(n-71)²/2465	dB
25	70 cm xmtr PA temperature	(n-120)/1.71	C
26	Solar panel #3 temperature	(n-120)/1.71	C
27	Solar panel #4 current	(n-15)•4.854	mA
28	Special purpose	xxxxxxxxxx	-
29	24 cm rcvr temperature	(n-120)/1.71	C
2A	Solar panel #5 temperature	(n-120)/1.71	C
2B	Solar panel #3 current	(n-15)•4.854	mA
2C	+14 volt regulator voltage	(n-10)•66.8	mV
2D	RUDAK temperature	(n-120)/1.71	C
2E	Top (+Z) skin temperature of arm #1	(n-120)/1.71	C
2F	Solar panel #2 current	(n-15)•4.854	mA
30	Mode B transponder +9 V supply voltage	(n-10)•54	mV
31	Wall temperature in arm #2	(n-120)/1.71	C
32	Bottom (-Z) skin temperature of arm #1	(n-120)/1.71	C
33	Solar panel #1 current	(n-15)•4.854	mA
34	Special purpose	xxxxxxxxxx	-
35	Wall temperature in arm #1	(n-120)/1.71	C
36	N2O4 tank temperature	(n-120)/1.71	C
37	Reserved		-
38	Auxillary battery voltage	(n-10)•78.5	mV
39	Mode S transponder temperature	(n-120)/1.71	C
3A	+Z platform temperature (SERI experiment)	(n-120)/1.71	C
3B	Reserved		-
3C	Mode L transponder +9 V supply voltage	(n-10)•45.4	mV
3D	AZ-50 tank temperature	(n-120)/1.71	C
3E	Nutation damper temperature	(n-120)/1.71	C
3F	Reserved		-

NOTES:

IHU = Integrated Housekeeping Unit; the computer
BCR = Battery Charge Regulator
He = Helium
SEU = Sensor Electronics Unit
N2O4 is nitrogen tetroxide; the propellant oxidizer
AZ-50 is Aerozine 50, the propellant fuel; a 50% mix of UMDH and Hydrazine.
UDMH is unsymmetrical di-methyl hydrazine.

Notes regarding channels 14 and 18:

These two sensors detect sunlight on the top (+Z) surface and the bottom (-Z) surface of the spacecraft. The provide only a rough indication of sun position and are used to resolve ambiguity in the readings from the sun sensors. When in full sunlight, a count of 65 will result. A count of about 10 is background noise only. The sun is declared present when the count exceeds 20. The main spacecraft solar cell arrays receive maximum illumination when the sun is perpendicular to (normal to) the spin axis (Z-axis). When this condition exists, both the +Z and -Z detectors will yield background readings (10) only. A count of 20 or greater on either indicates misalignment. The higher the count, the greater the misalignment of the spacecraft with respect to the sun angle (beta angle).

Tracking System Identifies AO-13 Quickly, Positively

Thanks to the teamwork of AMSAT and government engineers and analysts, the constellation of objects placed into orbit by Ariane V-22 was quickly sorted out. By Friday, June 17, all concerned were convinced they had identified AO-13. Since then AO-13 has been assigned international catalog number 19126 and object number 88 51B.

Initial tracking data was available within an hour of launch as the European Space Agency (ESA), NASA and various government radars around the world quickly acquired and tracked the Ariane payloads Meteosat, Panamsat and AO-13. In addition to the payload satellites, several other objects were in the vicinity: the Ariane third stage; the SPELDA upper section and the cylindrical carrying structure in which AO-13 had been enclosed. Using various analytical techniques such as spin rate and radar cross section, analysts had a pretty good idea by June 16 which objects were which. Then on Thursday evening, June 16, both Meteosat and Panamsat fired their kick motors and left the vicinity of the remaining objects.

Working with AMSAT's own ranging system, command stations began ranging June 16. Using the values obtained, Phil Karn, KA9Q, was able to get a good match between AMSAT's ranging data and the ephemeris supplied by the Millstone Hill radar. This confirmed earlier suspicions that analysts had correctly pegged the new OSCAR almost right from the start. AMSAT's ranging team makes precise orbital determinations by measuring the transit time of pulses sent to and returned from the satellite.

Telemetry From AO-13 Says All's Well

AO-13's telemetry is its link to the outside world in terms of what's going on in the satellite and how it "feels"; its health status. The telemetry is sent in three forms. The primary mode is digital data sent in a 400 baud, BPSK (Bi-Phase Shift Keyed) stream. This requires a special demodulator. (Such a demodulator is described in "Ham Radio" magazine for April, 1985.) On the hour and half hour, as a concession to tradition, 10 wpm CW reports are made. Then, at 15 and 45 minutes past each hour, RTTY messages using Baudot code at 50 baud, about 60 wpm, are sent. The BPSK message contains the full telemetry suite and narrative messages as well. The birthday greeting in message QTC 001 was sent in five languages.

A new telemetry software package has been developed under the auspices of AMSAT-VK and is now being handled in the U.S. by Project OSCAR according to Project OSCAR President Ross Forbes, WB6GFJ. The software for IBM-PCs and compatibles will decode Phase 3C 400 baud PSK telemetry via the RS-232 communications port COM1 using the G3RUH PSK Demodulator as published in *Wireless World* Oct/Nov 1984 and *Ham Radio* in April 1985. The current version (V0.5) of the software basically decodes AO-10 telemetry but has been modified to accommodate the latest Phase 3C channel allocations. An updated version is being prepared now that AO-13 telemetry has been calibrated. For further details, please contact AMSAT-Australia P.O. Box 2141, Adelaide, South Australia Postcode 5001. Information may also be obtained from Project OSCAR P.O. Box 1136 Los Altos, CA 94023. An SASE would be appreciated.

The TAPR DSP project will also result in a hardware/software package capable of decoding AO-13 telemetry AMSAT has been advised.

The revised AO-13 telemetry table appears elsewhere in this *ASR*.

Launch Day Coverage Exceeds Highest Expectations

An unprecedented network of Amateur Radio and commercial telecommunications facilities brought a special sense of poignancy and moment to the launch of Phase 3C. Hundreds of thousands of Amateurs in every region of the world were tuned in to hear the countdown and then the good news of AO-13's birth.

The AMSAT Launch Information Network Service used leased telephone lines to link together major HF facilities in the U.S. and overseas. Retransmission from nodes in England (G3RWL), Argentina (LU1AHC), Japan (JA1ANG), Southern Africa (ZS6AKV) and others provided excellent coverage to all continents. In the U.S., W1AW, W6VIO, WA3NAN and W5RRR did yeoman duty in blanketing the ionosphere with launch audio. AO-10 was in ideal position to relay news of the launch to the Western Hemisphere and Europe. Hundreds listened in on the downlink of 145.957 MHz provided by WA2LQQ.

Audio feeds from NASA mission communications, Kourou and nodal managers such as JA1ANG and LU1AHC added a realism and scope to the event. Video broadcasts on SPACENET 1 and Galaxy 3, together with CATV coverage on C-SPAN allowed many to obtain multi-media coverage of the launch all in real-time.

Other outlets for the ALINS network included dozens of VHF and UHF repeaters around the country and around the world. Those overseas were typically fed by the major overseas nodes via landline or by patch from excellent HF feeds from W1AW and the other HF stations on board.

Congratulations and enthusiastic questions swamped AMSAT's phone lines immediately after the launch. A wave of relief and elation seems to have swept over a large portion of the Amateur Radio community many of whom watched or listened to the launch on ALINS and cable.

The only sour note was the disappointing C-SPAN programming. The guests were clearly unprepared and had to be coached by the phone-in audience as to factual matters. C-SPAN informally told AMSAT they realized they were in trouble when the scheduled guest could not appear as planned. The AMSAT video tape which had been prepared didn't air either. AMSAT officials called that a "disappointment" and an "opportunity missed" but said they understood the pressures of broadcasting.

Nevertheless, coverage by Arianespace on SPACENET 1 was superb. Excellent graphic depictions of major flight milestones were presented. Bill Pasternak, WA6ITF, says he got "outstanding" video on 1 inch studio tapes and will be making 3/4 inch U-Matic tapes available to the AMSAT Video Tape Library as possible. Tape Librarian Tom Larson, N1CHM, will convert these to VHS for AMSAT member viewing.

The technical quality of the ALINS was, in a word, perfect, thanks in large measure to the planning and execution of VP of Operations Ralph Wallio, WØRPK. Ralph had developed a comprehensive ALINS plan and updated it regularly as changes required. Ralph also contracted for the telebridge service, which was simply excellent in all regards and he acted as tech control for the teleconference as well. In sum, it appears this was one of the most effective uses of multi-media telecommunications in Amateur Radio history thanks in large measure to the planning and execution of WØRPK as well as the various coordinating managers around the world. AO-13 ALINS was an outstanding success and was, according to listener Skip Reymann, W6PAJ, "Amateur Radio at its best!"

Cosmonauts Return After 10-Day Mission

The joint Soviet/Bulgarian cosmonaut crew returned safely from the orbital station MIR to the steppes of Kazakhstan on Friday, June 17. Soviet flight commander Anatoly Solovyov, flight engineer Viktor Savinykh, and Bulgarian research cosmonaut Alexander Alexandrov touched down just after 2 PM local time (1000 UTC) in their Soyuz descent module after completing a ten day mission to the permanently manned complex.

They were bid farewell only hours earlier by their hosts Vladimir Titov and Musa Manarov who had gone over six months without guests aboard their orbiting home. The team had worked jointly on 46 experiments during their stay and in keeping with standard Soviet practice, brought home the older TM-4 spacecraft leaving the newer TM-5 attached to the station.

Within minutes of the safe landing of the 63rd manned Soviet spaceflight, all three crewmen were awarded the Order of Lenin, the Gold Star Medal and the title Hero of the Soviet Union.

The resident crew, Titov and Manarov, are expecting guests again later this summer when a Soviet/Afghan crew blasts off August 29 from the Baikonur Cosmodrome for the MIR station and again in November when a Soviet/French team visits for 30 days.

Transpolar SKITREK Progress Report #17: May 21, 1988

The thirteen members of the Amateur Radio supported Transpolar Skitrek Expedition have made excellent progress this week as they near the coast of Ellesmere Island, North West Territory, Canada. On May 20th they were just 273 km from their destination. They plan on coming ashore on Ward Hunt Island, just to the north of Cape Columbia. The moving group will

have one more supply and science stop before the trek ends. All is well with the skiers as they continue southward and the weather moderates. Temperatures they are reporting have risen to a balmy -10 degrees Celsius. The skiers' position as of Saturday, May 21st was latitude 85d 28.8m North and longitude 77d 09.5m West.

The Soviet ice island NP-28, one of the principal communications bases for the expedition, is now experiencing rapid break-up. The past week saw it split into 4 pieces. The crew is now seriously considering abandoning the station as it continues its southward drift. Continued fracturing has shrunk the airstrip to less than half its original length. Barry Garratt, 4KØDX/VE3CDX, Canadian communicator on the "island" lost part of the communications gear on Saturday, May 21st, when the HF linear amplifier fell into the sea as a lead opened up.

Temperatures at Resolute Bay, NWT, Canada, are now often above zero. The last Canadian communicator, Rick Burke, VO1SA, has now arrived at Resolute. Rick, you may remember, spent a month in the Soviet Arctic back in March as the trek began.

Transpolar SKITREK Progress Report #18: May 28, 1988

The Amateur Radio supported Transpolar Skitrek Expedition moved toward a close last week as the skiers reached a point just 71 km away from the Canadian shore on Saturday, May 28th. They will be making landfall at Ward Hunt Island which has a latitude of 83 degrees 6 minutes North. A 10 km wide lead awaits them in the next few days which they will cross in large inflatable rafts brought by Twin Otter aircraft from Resolute Bay. The rafts the skiers have carried with them are small, single person units, that are impractical to use on large bodies of water such as the lead the skiers face. The Soviet skiers have requested and will receive a final resupply just before crossing the lead.

The weather and ice conditions of late have made for slow progress. Fog, rough ice with water on it, pressure ridges and many small open leads have limited the skiers movement to about 22 km per day. Moderating temperatures (between -10 and -6 Celsius) are causing much of the ice problems along with a rapid (as much as 12 km/day) southward drift of the ice pack. If progress continues at the current rate, and the large lead does not slow them down, the skiers should make Ward Hunt Island between June 1st and 3rd.

The Soviet Ice Island NP-28 has not experienced any further damage due to ice fracturing since the loss of communications gear last week. Barry Garratt, 4KØDX/VE3CDX planned to leave the island May 29th and is returning to Canada via the Soviet Union. The Royal Canadian Air Force has joined the Skitrek communications team with their amateur station VE8RCS located at Alert on Ellesmere Island.

SKITREK Arrives On Canadian Soil; Progress Report #19, June 4, 1988

The Great Transpolar Skitrek Expedition came to a successful conclusion on Wednesday June 1, 1988 at 14:35 UTC as the 13 skiers stepped ashore onto Ward Hunt Island. Ward Hunt, a tiny island off the coast of Cape Columbia, Ellesmere Island, has seen the beginning and end of many a polar expedition, but never one of this magnitude.

The last days on the ice were spent with some frustration by the skiers. They were told that a 10 km wide lead of open water awaited them and that a special air drop of rafts might be necessary. Temperatures dropped from -4dC to -14dC, however, and the lead closed and froze to a rough ice state with many pools of open water. The skiers wove back and forth making very slow progress for a day or so before encountering more normal ice conditions. On the last day of their trek the skiers made 18 km or so, crossed the ragged boundary between pack and land ice and trekked ashore where they were met by a plane from Resolute. For classroom trek logs, the last position they reported (just off-shore) was 83d 06.8m North, 74d 39.2m West. End of trek medical tests were conducted by the two skier/doctors and the group headed south to Eureka where they were met by the press and trek support teams. The skiers are now in Ottawa for debriefing, family reunions and well deserved celebrations.

A final wrap-up will appear in the next issue of ASR.

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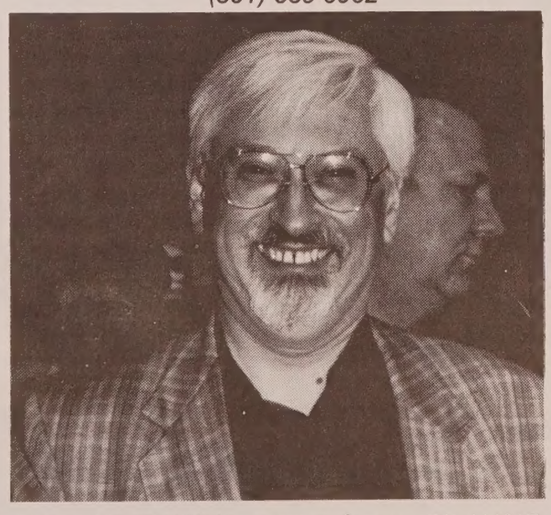

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